REMARKS

This application has been amended in a manner believed to place it in condition for allowance at the time of the next Official Action.

Claims 2, 5, 6, 9, and 13 are amended.

Claims 14-18 are new.

Support for the amended and new claims may be found, for example, at specification page 4, lines 1-7, page 8, lines 2-3 and 15-20, page 9, lines 12-17 and page 10, lines 17-23

Claims 2, 5, 6, 9, and 13-18 remain pending in the application.

The Official Action rejects claims 2, 5, 6, and 9 under 35 USC §103(a) for being unpatentable over CARBO et al. U.S. 4,507,339 (CARBO) in view of UCHIDA et al. U.S. 4,248, 676 (UCHIDA). This rejection is respectfully traversed.

CARBO is offered for teaching a structure comprising a metallic material with a matte surface and a chromium-oxide passivation film disposed on the metallic material surface, i.e., a chromium/chromium oxide surface treatment. The Official Action recognizes that CARBO fails to disclose the matte surface has a surface roughness as recited or that the passivation film has pin holes which are filled.

UCHIDA is offered for teaching a steel plate that is passivated and made corrosion resistant with a chromium layer

having pin holes which are filled to prevent crack formation, and the matte finish has a surface roughness of 0.8-3μm.

The position of the Official Action is that the surface roughness is a result effective variable with regard to the adherence of the coating, and that it would have obvious to have filled pin holes in the passivation film of CARBO in order to prevent crack formation in view of UCHIDA. The Official Action does not give patentable weight to to the recitation "formed by oxidizing a chromium film coated onto the metallic material surface".

However the proposed combination fails to render obvious the claimed invention for at least three reasons:

I. The combination fails to teach that the surface roughness is a result effective variable with regard to the adherence of the coating.

This concept is disclosed in the present specification at page 6, lines 3-11:

> In the invention, a contact ability of an interface between the metallic material and a coat film is improved by coating chromium onto the metallic material of which the surface roughness (Ra) is not more than 1.5μm, in addition to strengthen a coupling force of the interface by applying heat treatment solves the poorness of the conventional adhesion, and in addition, the chromium-oxide passivation film excellent in corrosion resistance can be formed by applying oxidizing treatment.

Thus, absent any evidence from the cited publication, it appears that the Official Action has relied on impermissible

hindsight based on the present specification to arrive at this conclusion.

II. The combination fails to teach the filled pin hole feature.

The position of the Official Action is that it would have obvious to fill pin holes in the passivation film of CARBO in order to prevent crack formation in view of UCHIDA.

CARBO does not disclose pin holes.

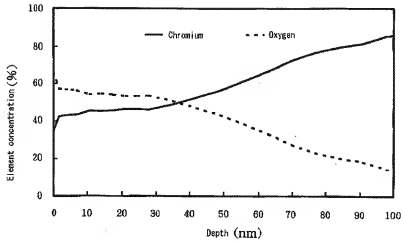
However, UCHIDA fills the cracks of a chromium layer with a chromate (chromium oxide and/or chromium) layer.

Thus, the combination cannot teach that pin holes in the chromium-oxide passivation film are sealed. See, e.g., claim 2.

III. The combination fails to teach a structure formed by the claimed process steps.

The Official Action does not give the patentable weight to the manner in which the claimed structure is obtained.

The claims are now directed to heating a chromium film coated directly onto the metallic material surface in an oxidizing atmosphere. This treatment results in a substantially 100% chromium-oxide layer, as evidenced by Figure 2 of the present application, shown below:



That is, the elemental composition of the film is Cr_2O_3, i.e., a chromium concentration of 40% and an oxygen concentration of 60%, at a depth up to about 30 nm in Figure 2. The film includes both Cr and O at a thickness of more than 30 nm thickness. Thus, the thickness of the chromium-oxide is not limited to 30 nm in the present invention, and it is possible to obtain more than 30 nm of Cr_2O_3 passivation film (e.g., by heating for a longer time).

The proposed combination of CARBO and UCHIDA fails to teach a chromium-oxide deposit formed by heating a chromium film coated directly onto a metal surface in an oxidizing atmosphere, which results substantially 100% chromium-oxide layer. Indeed, neither CARBO nor UCHIDA disclose such a process or an structure that suggests such a process.

CARBO discloses a chromium/chromium oxide metal surface treatment intended for beverage containers, but fails to disclose heat treating a chromium coated film metal surface in an oxidizing atmosphere.

UCHIDA discloses a chromium oxide and/or chromium film applied directly to a first chromium layer to a metal surface.

Thus, the proposed combination fails to disclose or suggest a structure resulting from a chromium-oxide deposit formed by heating a chromium film coated directly onto a metal surface in an oxidizing atmosphere.

Therefore, in view of the above, the proposed combination fails to render obvious claims 2, 5, 6, and 9, as well as new claims 14-18, and withdrawal of the rejection is respectfully requested.

Claim 13 is rejected under 35 USC §103(a) for being unpatentable over CARBO in view of UCHIDA, further in view of OHMI U.S. 5,656,099. This rejection is respectfully traversed.

CARBO and UCHIDA are relied on for the reasons discussed above. However, also as discussed above, the publications, alone or in combination, fail to teach the claimed surface roughness, the chromium oxide passivation film, and the process of forming the film.

OHMI discloses the formation of chromium-oxide, but does not include the structure in which chromium-oxide is formed after chromium film is formed. Instead, OHMI forms chromium oxide through the treatment of chromium within stainless steel with less-oxidative gas (mainly hydrogen) in a certain condition. If the processes and conditions are correctly prepared, impurities will be generated in chromium-oxide. That is, as the passivation

film is formed, the thickness of the film is increased as a result of chromium diffusion and simultaneously Fe oxide is formed because of the Fe diffusion.

The claimed invention, however, forms a chromium oxide film, which is 100% oxidized chromium on the surface as a result of the chromium being coated directly over the metallic material and annealed by oxidation gas. As a result, the thickness of the film is increased due to the diffusion of the chromium or the oxygen after the formation of the chromium oxide film. The oxides other than chromium oxides, such as Fe oxide, do not essentially exist near the interface between the metallic material and the passivation film in the claimed invention.

The formation mechanism of the claimed passivation film is different, because the process is different. Thus, the claimed invention, which is expressed in terms of product by process features, is indeed different from the OHMI publication. Accordingly, OHMI cannot remedy the shortcomings of CARBO and UCHIDA for reference purpose.

Therefore, the proposed combination fails to render obvious claim 13, and withdrawal of the rejection is respectfully requested.

With respect to new claims 14-18, these claims further emphasize the structure features that result from the recited process steps, i.e., the film is substantially free from impurities from the metal (e.g., steel) surface and the film is

free from holes and cracks. None of the publications suggest these features, either alone or in combination.

In view of the amendment to the claims and the forgoing remarks, applicants believe that the present application is in condition for allowance at the time of the next Official Action. Allowance and passage to issue on that basis is respectfully requested.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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